1. A 45° strain rosette is mounted, in arbitrary direction θ, on the surface of a rod with rectangular cross section (1.255 in x 0.324 in) as shown in figure below. The rod is subjected to a tensile load P = 10000 lbs along the longitudinal axis and strains are measured from the rosette are: ε_a = 0.000370, ε_b = 0.002326 and ε_c = 0.001221, respectively. (a) Plot the Mohr's circle of the strains obtained from the rosette, and from which determine the principal strains and the maximum shear strain. (10%) (b) Draw the Mohr's circle of the uni-axial stress state and determine the principal stresses and maximum shear stress. (5%) (c) Determine the Young's modulus and Poisson's ratio of the material of this rod. (5%) (d) Determine the orientation θ of the rosette. (5%)
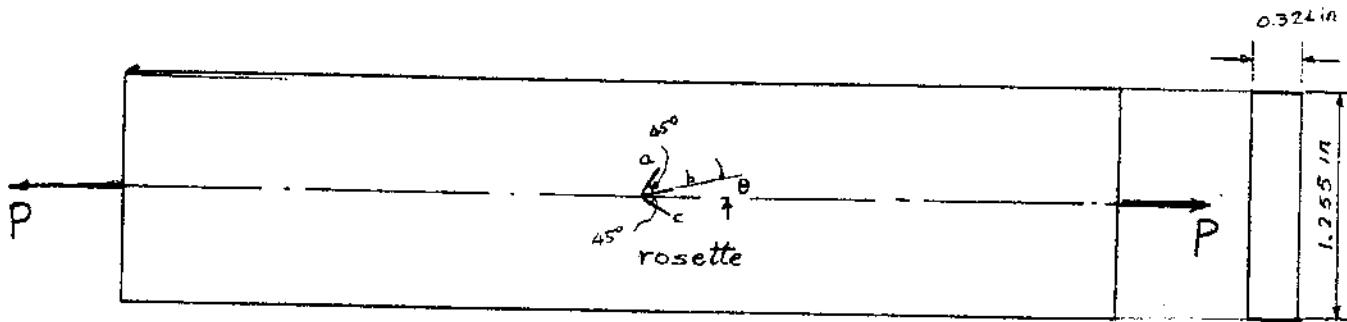

2. Refer to the figure below. Compute the position and magnitude of the maximum vertical deflection in this beam. E and I are constants, E = 30 x 10^3 ksi and I = 432 in^4. (25%)
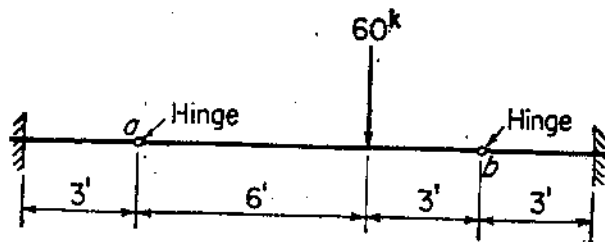
(背面仍有題目,請繼續作答)

3. Locate the shear center S of the thin-walled semicircular cross section shown in the following figure. Discuss the condition when the cross section does not possess any symmetry property. (2 5 %)
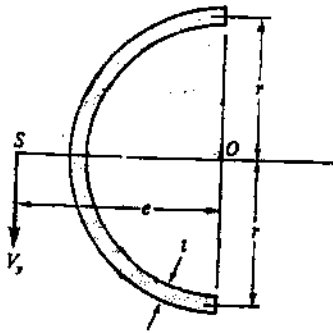
4. Determine the critical load and buckled mode shape for a column that is fixed at the base and pinned at the top. Discuss the condition when the axial load does not act at the centroid of the cross section. (2 5 %)